

REMARKS/ARGUMENTS

Office action summary

Amendment to Fig. 2C is found not to be in compliance with 37 CFR 1.121(d).

Claims 14, 16-18 and 33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicants' Prior Art (hereinafter "APA") in view of U.S. Patent No. 6,147,381 to Hirler et al. (hereinafter "Hirler") and U.S. Patent No. 5,151,762 to Uenishi et al. (hereinafter "Uenishi").

Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over APA in view of Hirler, Uenishi, U.S. Patent No. 5,793,064 to Li (hereinafter "Li"), and U.S. Patent No. 4,987,098 to Nishiura et al. (hereinafter "Nishiura").

Claims 19 and 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over APA in view of Hirler, Uenishi, and U.S. Patent No. 5,008,720.

Claim 20 is rejected under 35 U.S.C. § 103(a) as being unpatentable over APA in view of Hirler, Uenishi, and European Patent Application No. EP 1193767 to Matsudai et al. (hereinafter "Matsudai").

Objection to the drawings

The Office Action at page 2 states that the drawings were objected to because:

each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either 'Replacement Sheet' or 'New Sheet' pursuant to 37 CFR 1.121(d).

This objection is respectfully traversed because the replacement sheet of drawings included with the Amendment filed February 19, 2008 was labeled "Replacement Sheet" in the top margin in accordance with 37 CFR 1.121(d).

During a telephone conversation with attorney Kelvin Catmull on May 22, 2008, Examiner Lewis indicated that she had not noticed that the replacement sheet of drawings included with the prior Amendment was properly labeled with "Replacement Sheet." Examiner

Lewis further indicated that she believed the sheet was labeled in compliance with 37 CFR 1.121(d) and that the sheet did not need to be re-submitted. Thus, withdrawal of this objection is respectfully requested.

Rejection of Claims under 35 U.S.C. § 103(a)

Claims 14-20 and 32-33

Claims 14, 16-18 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over APA in view of Hirler and Uenishi. This rejection is respectfully traversed for the following reasons.

Independent claim 14 distinguishes over APA, Hirler, and Uenishi taken singly or in combination at least by reciting:

a first well region of a second conductivity ... coupled to an emitter terminal; a second well region of a second conductivity ... being in a floating state; ... where the first well region and the second well region have a substantially same depth in the drift region.

In rejecting claim 14, the Examiner starts with Applicant's Prior Art (APA) Fig. 2A, and then selects the needed features from Hirler and Uenishi to arrive at Applicants' claim 14 with complete disregard for the fact that both Hirler and Uenishi, when considered in their entirety, teach away from the combination suggested by the Examiner. The MPEP makes clear that in ascertaining the differences between the claimed invention and prior art to determine obviousness, a "prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention" [MPEP § 2141.02(VI)]. The Examiner's manner of rejecting claim 14 amounts to selecting and considering particular features of each reference in a vacuum rather than in the context of each reference as a whole.

The above citation from Applicants' claim 14 is directed to two features of the claimed invention: (1) two well regions where one is coupled to an emitter terminal and the other one is in a floating state, and (2) the two well regions have substantially the same depth. In the Office action, the Examiner indicates that to the extent APA Fig. 2A fails to teach a floating

second well region, Hirler teaches use of a floating region 15 in Fig. 1. While Hirler does show two well regions, namely, floating region 15 and base zone 6, Hirler requires that floating region 15 extend deeper than base zone 6. Thus, Hirler teaches away from the claim feature that first and second well regions have substantially the same depth. In response to this argument which was raised in Applicants' Amendment filed February 19, 2008, the Examiner states:

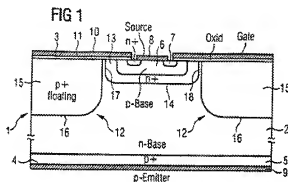
Hirler is not being utilized to teach a first well region and a second well region that have substantially the same depth in the drift region. Hirler is being utilized to disclose the use of a well in a floating state. [Paragraph 9 of Office action]

This is respectfully traversed because this manner of applying a reference, where a feature of the reference is extracted from the reference and considered in a vacuum rather than in the context of the reference as a whole is precisely what MPEP § 2141.02(VI) is intended to prevent. It is improper to pick and choose one characteristic of floating regions 15 (i.e., that they are in a floating state) and disregard other characteristics of floating regions 15 that must be present for floating regions 15 to function as Hirler intended and serve the purpose set forth in Hirler. Hirler makes clear that for floating regions 15 to function as intended and provide the identified advantages, floating regions 15 must meet certain criteria. One such criterion is that they must be in a floating state. Another such criterion, which Hirler characterizes as "essential," is that floating regions 15 must extend deeper than shielding zone 13:

"What is essential in this case is that the non-connected, floating regions 15 of the opposite conduction type have a penetration depth which is distinctly greater than the penetration depth of the shielding zone into the inner zone. The purpose of the non-connected, floating regions of the opposed conduction type with respect to the shielding zone 13 is to shield the regions directly at the cathode side, that is to say directly under the base zone 6, in other words to prevent the course of the equipotential lines from reaching as far as the lower edge of the base zones 6. This achieves a high blocking strength in addition to a very small V_{CESat} ." [Column 5, lines 2-13]

Emphasis is added. Thus, to achieve its goals of high blocking strength and a small V_{CESat} , Hirler requires that floating regions 15 have a depth distinctly greater than that of shielding zone 13. This is illustrated in Fig. 1 of Hirler reproduced below. Since base zone 6 is

fully embedded within shielding zone 13, then by extension, it is essential that floating regions 15 have a depth distinctly greater than base zone 6. This is in direct contrast to claim 14 which recites that first and second well regions have substantially the same depth.



Thus, when APA and Hirler are considered in their entirety, as required under MPEP § 2141.02(VI), modifying APA Fig. 2A to incorporate therein floating regions 15 in the manner taught by Hirler results in a structure with a floating well region 15 that extends deeper than well region 108 in APA Fig. 2A. Once again, this is in direct contrast to claim 14 which requires that the first and second well regions have substantially the same depth.

With APA and Hirler failing to show first and second well regions having substantially the same depth, the Examiner relies on Uenishi and asserts that Uenishi in Fig. 8 shows two well regions 705 that have substantially the same depth. Once again, in combining the teachings of Uenishi with APA Fig. 2A, the Examiner fails to consider Uenishi as a whole because, Uenishi requires that both well regions 705 in Fig. 8 be connected to cathode terminal K and thus neither of well regions 705 can be in a floating state. That is, when APA and Uenishi are considered in their entirety, modifying APA Fig. 2A to incorporate therein two well regions 705 in the manner taught by Uenishi results in a structure where both well regions must be connected to a terminal. This is in contrast to claim 14 which requires one of two well regions be in a floating state.

In combining all three references APA, Hirler and Uenishi, the Examiner seems to suggest modifying APA Fig. 2A to include a second well region that is of substantially the same depth as well region 108 (APA Fig. 2A) in the manner taught in Fig. 8 of Uenishi, and then

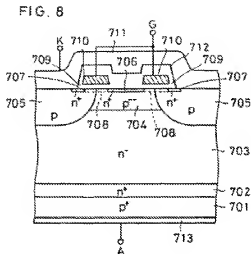
modifying the added second well so that it is in a floating state as taught in Fig. 1 of Hirler. However, if Hirler's teachings with respect to its floating regions are properly applied to the combination of APA and Uenishi, the resulting structure would necessarily have a floating well region that extends deeper than the other well region. Since a floating well region that is of the same depth as the other well region would not function as indicated in Hirler or yield the advantages set forth in Hirler, the Examiner must indicate why one skilled in the art would be motivated to use a floating well region that extends to the same depth as a second well region. Ignoring the essential characteristics of floating well regions 15 set forth in Hirler, as well as those relating to well regions 705 in Uenishi, runs foul of both MPEP § 2141.02(VI) which requires that references must be considered in their entirety, and MPEP § 2145(X)(D)(2) which prohibits combining references where the references teach away from their combination.

Claim 14 and its dependent claims 15-20 and 32-33 thus distinguish over APA, Hirler, and Uenishi taken singly or in combination at least for the above reasons.

Other claims depending from claim 14 recite additional features which further distinguish these claims over the cited references. For example, dependent claim 33 further distinguishes over APA, Hirler, and Uenishi taken singly or in combination at least by reciting:

wherein the impurity region abuts the first well region and the second well region.

The Examiner indicates that the claimed "first well region" is shown by region 108 in Fig. 2A of APA, and the claimed "second well region" is shown by region 705 in Fig. 8 of Uenishi. The Examiner also indicates that the claimed "impurity region" is shown in Fig. 8 of Uenishi. Fig. 8 of Uenishi is reproduced below.



As shown in Fig. 8 and explained by Uenishi, n+ type region 706 is formed at a distance from the boundaries between regions 704 and 705 (Uenishi at col. 7, lines 29-32). Thus, Uenishi fails to teach or suggest an impurity region that "abuts the first well region and the second well region" as recited in Applicants claim 33.

Summary of July 31, 2008 Examiner Interview

On July 31, 2008, the undersigned together with attorney Kelvin Catmull conducted a telephone interview on behalf of the Applicants with Examiner Lewis. During the interview, various embodiments of the invention were described to Examiner Lewis. Some of the distinguishing features of the claims were also explained in comparison to the cited references.

Examiner Lewis indicated that she would need to review the claims and cited references more closely before responding to the arguments articulated by the undersigned. A follow up interview was thus scheduled for August 14, 2008. Prior to the interview, however, Examiner Lewis canceled the interview indicating that she was unable to accommodate the interview due to time constraints and that she will consider the arguments in a formal submission.

In the Interview Summary mailed August 7, 2008 by Examiner Lewis, the Examiner describes the substance of the July 31st interview as follows:

Kelvin Catmull stated that the invention improves unclamped inductive switching and provides low on resistance. Additionally, it was stated that figure 3 which represents Applicant's invention provides low on resistance and good UIS unlike prior art figures 1A-1C and 2A-2C. Finally, it was stated that there is no reason to combine Hirler and Uenishi because Uenishi fails to disclose floating wells.

Applicants respectfully submit that this is not an accurate characterization of Kelvin Catmull's comments. It was clearly stated during the interview that Fig. 3 of the present application was used merely for illustrative purposes, and that it represents only one embodiment covered by the claims.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

/Barmak Sani/

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